NAVAL WAR COLLEGE

Newport, R.I.

SOCIAL SYSTEMS ANALYSIS: THE FUTURE OF OPERATIONAL INTELLIGENCE?

By

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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15 May 2003

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REPORT DOCUMENTATION PAGE

1. Report Security Classification: Unclassified	
2. Security Classification Authority:	
3. Declassification/Downgrading Schedule:	
4. Distribution/Availability of Report: DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.	
5. Name of Performing Organization: Office of the Provost	
6. Office Symbol: 1	**7. Address:** NAVAL WAR COLLEGE 686 CUSHING ROAD NEWPORT, RI 02841-1207
8. Title (Include Security Classification): Social Systems Analysis: The Future of Operational Intelligence?	
9. Personal Authors: Van Garraghty	
10.Type of Report: FINAL	**11. Date of Report:** 15 May 03
12.Page Count: 19	
13.Supplementary Notation: A paper submitted to the Provost, Naval War College, for the DIA Essay Award essay competition. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.	
14. Ten key words that relate to your paper: Social, Systems, Analysis, Intelligence, Patterns, Trends, Operational, Net, Assessment, JFCOM	

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16.Distribution / Availability of Abstract:	**Unclassified**	**Same As Rpt**	**DTIC Users**
17.Abstract Security Classification: Unclassified			
18.Name of Responsible Individual: Office of the Provost, Naval War College			
19.Telephone: 841-3589		**20.Office Symbol:** 01A	

[1] Joint Forces Command. Capability Change Recommendation Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities Format (Suffolk, VA 2003) See pages 2-3.

Abstract

Does social systems analysis provide the Joint Force Commander an advantage over a potential adversary? Joint Forces Command (JFCOM) believes the answer is "yes" by virtue of experiments and concept development work, to include that accomplished in MILLENIUM CHALLENGE 2002.[1] They assert that adding this type of analysis to more traditional forms of intelligence products (e.g.- Joint Intelligence Preparation of the Battlespace) provides the Joint Force Commander (JFC) more options in which to employ lethal and non-lethal forms of national power. Academics and complex adaptive systems experts are not as hopeful. They cite the inherent unpredictability of human-centered activities, whether they are at the individual or group level.

While the idea of incorporating social systems analysis in the JFC's intelligence toolkit is appealing, it has significant risks. Systems dynamics experts believe social theory is too imprecise and subjective to provide a sound foundation for systems analysis. Moreover, social systems analysis often blends theories, assumptions, and facts. This results in knowledge bases and representative analytical models that appear valid, but may not account for either unknowable facts (e.g.- human perceptions) or extemporaneous factors known only by the adversary. The result may be a false sense of security in the validity of intelligence assessments that are based on social systems analysis.

The critical patterns and trends that underlie adversary systems can be modeled. The challenge is to segregate subjective analysis from facts. A well-designed model that does so may provide the JFC the ability to visualize the otherwise abstract idea of effects-based operations.

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Introduction

The idea of using social systems analysis is an outgrowth of JFCOM's Operational Net Assessment (ONA) joint operational concept, which seeks to integrate key theater-level operations, plans, and intelligence staff functions using common knowledge bases and a comprehensive collaboration process.[2] The intelligence portion of the ONA centers on the idea that an adversary can be understood as a "system of systems." The focus is on the interrelationships and linkages between political, military, economic, social, information, and infrastructure (PMESII) systems that give an adversary the capacity to act against our interests. This methodology is intended to support effects-based operations by identifying key relationships, dependencies, and vulnerabilities both within and across systems. JFCOM asserts that this approach will enable the understanding of how these systems can be either attacked or manipulated by friendly diplomatic, information, military, and economic actions in order to decisively affect the behavior of the adversary.

The ONA was a central experiment within JFCOM's MILLENIUM CHALLENGE 2002 field experiment. Several military experts, including retired Lt. Gen. Paul Van Riper, criticized the ONA for promising valid predictions that were not backed up with objective facts.[3] The central concern he had with the PMESII analysis was that it attempted to model a nation-state. He argued that a nation-state is a complex adaptive system and therefore cannot be depicted in a computer model. He believed the models could represent a gross approximation of the whole, but that one cannot understand a complex adaptive system by breaking it down into its parts (e.g.- PMESII systems). This means that predictions derived from the systems analysis are likely dubious, especially in times of

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[2] Joint Forces Command. "Operational Net Assessment Fact Sheet" March 2003

[3] Lieutenant General Paul Van Riper expressed his views on the ONA in MILENNIUM CHALLENGE 2002 concept development and experiment planning meetings in which I attended.

combat. The predictions are poor because a potential adversary can adapt and create choices. The adversary may not even know potential courses of action until faced with a critical decision point as events unfold.

The social science field does have a history with systems theory. Social scientists find that systems analysis techniques help them gain insight into cause-effect relationships. The problem is that social theory is subjective and pure systems theory is objective. This often leads to extrapolated insights and understanding derived from the systems analysis techniques. The question for the Joint Force Commander is whether it is wise to base military decisions on the extrapolated predictions derived from the marriage of these two fields.

JIPB and the Relationship to the ONA

Today, the JFC relies on the Joint Intelligence Preparation of the Battlespace (JIPB) process to support the operational level decision making process.[4] The main focus of JIPB is to provide an intelligence assessment to help the JFC discern the adversary's probable intent, most likely, and most dangerous courses of action.[5] JIPB is used at the strategic, operational, and tactical levels. It is a dynamic process that focuses on the relationship between friendly and enemy capabilities, centers of gravity, and potential courses of action. According to JFCOM, JIPB feeds the military portion of the PMESII systems analysis.

JFCOM asserts that the ONA process takes a broader view of the adversary's "system of systems" in order to support diplomatic, information, and economic actions as

[4] U.S. Joint Chiefs of Staff. Joint Tactics, Techniques, and Procedures for Joint Intelligence Preparation of the Battlespace, Joint Pub 2-01.3 (Washington D.C. 24 May 2000). page vii
[5] Ibid., pages 1-1 thru 1-3

well as military operations. The implication is that the increased understanding of the adversary that results from such analysis will help to synchronize/optimize the application of national power. This is the key question explored in this research paper→ does PMESII systems analysis (i.e.- Social systems analysis) offer the JFC a distinct military advantage that the JIPB process does not? The answer may lie in the coupling of social theory and systems theory.

Analysis

Systems Theory, Systems Analysis, and the Social Sciences

In the social sciences, people in a society are considered a system if they are organized by a characteristic pattern of relationships.[6] Social systems are connected via both formal and informal networks. The term *structure* is used to describe an organization and *agent* is used to describe the people that comprise the organization. These terms of reference are necessary to understand the relationship between systems theory, systems analysis, and the social sciences.

Ludwig Von Burtalanffy proposed general systems theory in the 1940's. Rather than reducing an entity (e.g.- the human body) to the properties of its parts or elements (e.g. organs or cells), systems theory focuses on the arrangement of and relations between the parts that connect them into a whole. These concepts and principles of organization underlie several disciplines of study such as physics, biology, technology, and sociology.[7] *Systems*

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[6] WordNet ® 1.6, © 1997 Princeton University. Dictionary.com [May 2003]

[7] Heylighen, Francis and Cliff Joslyn (2000): "What is Systems Theory? ", F. Heylighen, C. Joslyn and V. Turchin (editors): *Principia Cybernetica Web* (Principia Cybernetica, Brussels), {http://www.pespmc1.vub.ac.be/SYSTHEOR.html} [May 2003]

analysis was developed independently of systems theory.[8] It applies systems principles to aid a decision-maker with problems of identifying, reconstructing, optimizing, and controlling a system (usually a socio-technical organization), while taking into account multiple objectives, constraints, and resources. It aims to specify possible courses of action, together with their risks, costs, and benefits.[9]

Sociotechnical systems analysis is the study of technology's impact on a social organization. In 1976, Albert Cherns established nine principles of sociotechnical systems (STS) design and other researchers have contributed as many as 15 additional principles.[10] These principles, which address items such as learning, experimentation, and information flow, are used to understand the designs and workings of smaller, discrete social structures/organizations. In modern times, technology is the key enabler of adaptability and learning social structures, especially for the advanced adversaries a JFC may face.

Sociologists have used systems analysis principles as a metaphor to understand the relationships within and between countries.[11] Immanuel Wallerstein's 1974 book *The Modern World-System* attempted to explain the origins and persistence of global inequality through the use of systems analysis tools. He advanced his ideas by describing economic inter-relationships between countries (e.g.- money and human capital flows) by using the metaphor of a human circulatory system. Sociologists have found the metaphor of a world system a persuasive way to view the events and interactions of human history.[12]

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[8] Ibid.
[9] Ibid.
[10] Berniker, Eli. "Some Principles of Sociotechnical Systems Analysis and Design" School of Business Administration, Pacific Lutheran University (October 1992) {http://www.plu.edu/~bernike/SocioTech/PRincples%20of%20STS%20design.doc} [May 2003]
[11] Cummings, William. "World History and Its Metaphors: The Case of World 'Systems'" *Electronic Journal of Sociology* (2000) {http://www.sociology.org/content/vol005.002/cummings.html} [May 2003]
[12] Ibid.

Social Systems Analysis in the JFCOM Context

JFCOM is using the social systems analysis metaphor to understand the PMESII systems relationships in an adversary country.[13] PMESII systems analysis is found in the intelligence portion of the ONA. Representative models and knowledge bases are used to portray the analysis. The information that forms the basis for the analysis is drawn from the Intelligence Community (IC) as well as any other credible information source such as academia, industry, and international partners.[14] The bulk of the analysis residing in the PMESII models and knowledge bases is based on factual information that is tangible and observable. Examples include information on road networks, military and communications facilities, order-of-battle, and lines of communication. Subjective information forms the basis for the rest of the analysis, especially in the political, economic, information, and social systems. Examples of subjective data include analysis on items such as interrelationships between demographic groups, the links between politics and economics, and the flow of information in a population. The PMESII systems analysis is intended to provide a baseline understanding of the adversary and for planning effects-based operations.

As stated above, sociologists use the systems analysis metaphor to understand complex problems in society. JFCOM is proposing that a JFC can use the same methodology as a basis for effects-based operations. Is this a realistic application of social systems theory?

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[13] Joint Forces Command. "Operational Net Assessment Fact Sheet" March 2003

[14] I was a primary author of the Operational Net Assessment. One of my duties was to create the processes to conduct the systems analysis, develop information sources, and establish collaborative partnerships. In this capacity, I had first hand knowledge of the types of information contained in the ONA.

System dynamic's experts do not believe so.[15] Social scientists have worked with systems dynamics theory experts to identify network/systems theory applications to social theory. In one study, system dynamicists attempted to apply systems theory to social theory.[16] They came to the conclusion that any attempt to ground system dynamics in integrative social theories will encounter at least two significant difficulties.[17] First, social theories suffer as a result of abstract style and imprecision of terms. Social theories remain in the scholarly context and are often subject to qualitative analysis and descriptive theorizing.[18] There are neither quantitative models nor common terms among various theories to base a sound, consistent systems approach. Second, the integrative social theories tackle complex social issues with indirect cause-effect relationships. This leads to a bias towards subjective social theories that are as varied as there are scholars.[19]

The enduring problem with integrative social theory is that highly adaptable agents (i.e.- people) are the major building blocks of societal structures/organizations. Although social structures often normalize the behavior of individuals over time (e.g.- Department of Defense doctrine), they tend to adapt as circumstances change. The social scientists have found that people adapt faster and more unpredictably than the control measures governing a typical social structure. The reason why is that integrative social structures are open vice closed systems. While they are designed to operate in normalized behavior patterns, the nature of an open system is that adaptations will occur as conditions

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[15] Lane, David. "*Rerum Cognoscere Causus: Part I and II* Opportunities Generated by the Agency/Structure Debate and Suggestions for Clarifying the Social Theoretic Position of System Dynamics" *System Dynamics Review* VOL. 17, NO.4, Winter 2001. Page 293
[16] Ibid., Page 302
[17] Ibid., Page 304
[18] Ibid., Page 300
[19] Ibid

change. This is particularly troublesome in a combat environment when the socials systems are undergoing major perturbations.

The challenge facing the JFC is to develop methodologies that convert our understanding of the social systems dynamics in a target country into reliable predictive assessments. This is the critical link between PMESII systems analysis and effects-based operations. The challenge is to find tools that can help overcome the inherent weakness in social systems analysis in order to provide more accurate predictions.

Tools to Help Convert Social Systems Analysis into Accurate Predictions

There are at least three tools that can be used to more accurately predict the responses of a social system- network theory, dyadic analysis, and game theory. A discussion of each follows.

Nation-states are inherently networked entities. Social network theory is one of the few if not the only theory in social science that is not reductionist.[20] Simply defined, a network contains a set of objects or nodes and a mapping or description of relations between the objects.[21] In the context of JFCOM's ONA, there are clearly significant nodes and relationships in a nation-state PMESII construct. These networks can be mapped to a large degree; however, potential adaptations and connections are almost certainly too numerous and complex to model.

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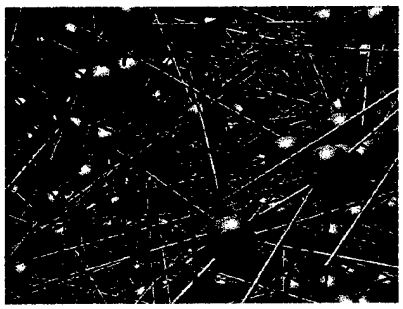
[20] Kadushin, Charles. "A Short Introduction to Social Networks: A Non-Technical Elementary Primer" May 2000 {http://construct.haifa.ac.il/~cerpe/papers/kadushin.html} [May 2003]
[21] Ibid.

The illustration below is a visual example of the networked social links found in Canberra, Australia.[22] Note the three-dimensional connections of the individuals.



In spite of the complexity of social network analysis, the Joint Warfare Analysis Center (JWAC) has demonstrated the potential utility of social influence network analysis. Influence net modeling helps analysts evaluate relationships among disparate people, entities, and events. The process works best when analysts are coupled with access to a variety of classified and unclassified information to collaborate on a common problem set. The JFC can use this network analysis to attack critical vulnerabilities in an adversary, such as his political power base. While this analysis has great potential, the illustration of Canberra, Australia demonstrates the potentially exponential complexity if applied to a complex and technically advanced adversary. Social influence network theory is promising, but mostly when applied to relatively isolated and small-scale adversaries.

A derivative form of social network theory is dyadic analysis.[23] This type of analysis attempts to break complex interactions down to a one versus one analytical framework. The analysis can center on the relationships between the individual elements within PMESII systems or between two major systems (e.g.- political-social, military-

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[22] Freeman, Linton. "Visualizing Social Networks" *Journal of Social Structure* VOL 1 {http://www2.heinz.cmu.edu/project/INSNA/joss/vsn.html} [May 2003]

[23] Russett, Bruce. "Violence Prediction" Revised 2003, *Encyclopedia of Public Health* {http://www.yale.edu/unsy/brussett/ViolenceforEncyclopedia.pdf} [May 2003]

economic). In one research report, international relations students were able to predict with high probability the likelihood of conflict between two nations using dyadic analysis.[24] In the study, they identified every recognized country for the last 150 years and recorded who they engaged in conflict with through this time period. Predictions were extrapolated from the resulting data. They determined that if one could travel back in time, they would have predicted with a high degree of accuracy the potential for conflict between two countries. Proximity (i.e.- shared borders) was revealed as the biggest predictor of conflict. The problem found in the study was that the high percentage of certainty was so closely correlated with proximity that the predictions were far less certain if two countries engaged in conflict, but did not share a common border. The primary shortfall of dyadic analysis from a JFC perspective is that it tends to be one-dimensional. What appears to be a very valid indicator of future activities is often overcome by extenuating factors, many of which are not known in advance.

Scholars, businesses, and the Department of Defense use game theory to help address complex problems. Game theory holds much promise, but like a computer-based model its limitations are in the variables. No matter how complicated a game is it cannot replicate a complex entity like a nation-state. One academic research report was particularly instructive.[25] The researcher set up a game in which one player had to predict whether a second player was going to show heads or tails on a coin next. No matter how much practice and preparation, the guessing player was unsuccessful at predicting the other player's move

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[24] Ibid.

[25] The original research report was conducted at the University of Tel Aviv. In its place, I replicated the study using two predictive devices→ a coin and a die. For the first prediction cycle, three control subjects were asked to predict what side of the coin a fourth player would reveal. The average prediction success rate was 49% correct guess. In the second prediction cycle, three control subjects were asked to predict the side of a die a fourth player would reveal. In this case, the average success rate was 15%. My results closely matched the research report. I felt the die more accurately represented a real world situation in which an adept adversary can create multiple options.

at a success rate better than random chance. In fact, even if the guessing player detected a pattern or trend it did not help his odds for long. The reason is that eventually the player placing the coins would discover the other player had detected a pattern and trend and thus he would deliberately trap the other player by breaking the pattern or trend randomly. This report's finding is particularly instructive regarding social systems analysis. If an adversary ever detected that a JFC had detected a behavioral pattern or trend that reflected our understanding of them, it is highly likely they would deliberately attempt to alter their behaviors.

The Impact of JFCOM's Ideas on Social Systems Analysis on the Intelligence Process

JFCOM's concept of using social systems analysis as a basis for effects-based operations is not founded on sound academic research. Notwithstanding JWAC's success of using social network analysis in isolated cases, it is highly problematic to assume social systems analysis provides a sound foundation from which to base military operations. Social theories are simply too subjective and a sophisticated adversary can use any number of relatively simple techniques to invalidate the analysis.

JFCOM's exploration of social systems analysis did highlight a potential advancement in intelligence analysis techniques- persistent analysis and surveillance of an adversary through the use of models.

Recommendations

JFCOM's quest to improve intelligence support to military operations through social systems analysis has highlighted the need to transform intelligence. It is clear that social systems analysis could advance traditional "industrial-age" intelligence products into

more dynamic and holistic "information-age" analytical services. Social systems analysis requires persistent analysis, information sharing, and collaboration between both the IC and non-intelligence sources of information. This dovetails with the emerging JFC requirement for persistent surveillance and analysis of an adversary, which is required to support today's high tempo military operations.[26]

The pursuit of persistent, holistic analysis of an adversary requires that today's core intelligence processes that use linear collection, analysis, and dissemination methodologies needs to give way to parallel, interactive processes. New products and services need to emerge that improve warning, the depth and breadth of databases, and the analytical process. The challenge is to develop products and processes that use a steady feed of objective data to create patterns and trends and a mechanism for adding subjective analysis.

Financial analysts, meteorologists, and medical doctors provide instructive examples of professions who analyze complex raw data in real time to make both tactical and operational predictions. For example, financial analysts use technical analysis stock charts, meteorologists use weather stations, and medical doctors monitor patient's vital signs through medical diagnostic equipment displays. In each, a steady flow of raw data builds a real-time picture of past and present activities. Over time, the picture develops a pattern in which normalized activity levels emerge. Anomalies in the patterns and trends are readily identifiable. The patterns and trends are stored in databases in the event that similar activities take place in the future.

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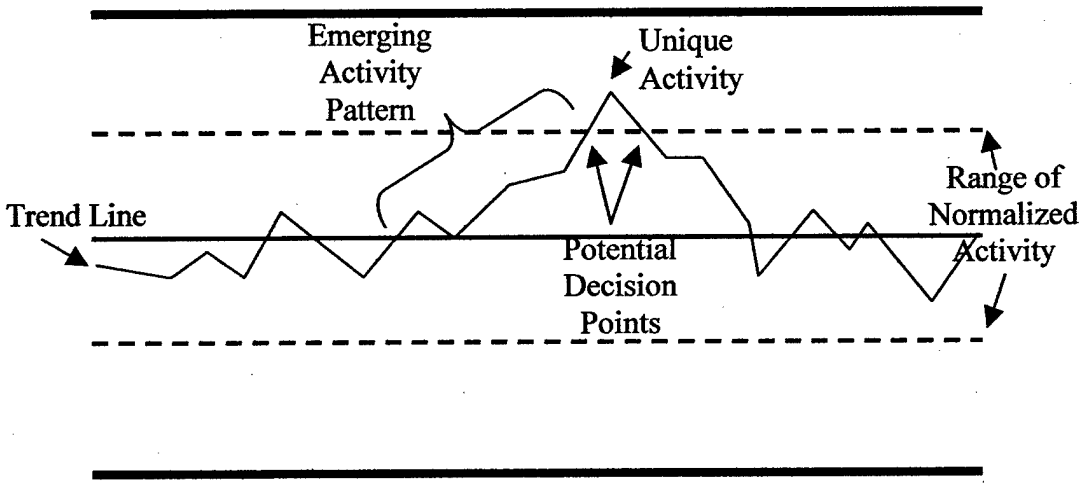
[26] ADM Vern Clark and RADM Porterfield both emphasized this point during their presentations at the Naval War College in April 2003. Their comments were directly related to lessons learned from the military operations in Afghanistan and Iraq.

The IC may be able to design similar processes to track adversary PMESII activities in much the same way. The challenge is to design models that satisfy complex sets of a JFC's essential elements of information and priority intelligence requirements. The models require a steady flow of raw data to graphically display activities in the form of patterns and trends. To accomplish this, high density, low demand, and unclassified sources are needed to augment low density, high demand, and classified intelligence collection assets. Persistent surveillance is the goal, vice aperiodic reconnaissance. The additional unclassified sources would enable information sharing on a broader scale, thus supporting broader collaboration. The models would display real time, continuously updated intelligence, yet simultaneously depict historical context and a crude forecasting capability. The graphic below represents a concept of a pattern and trend model.



Why the Intelligence Community Should Use Real-time Models as Products

The IC is collecting, analyzing, and disseminating ever-increasing volumes of intelligence. National, theater, and service organizations have created a host of networks,

data warehouses, and Internet-based applications to access and house nearly every type of intelligence produced. Yet, the quantity of digital intelligence available has not led to products and services qualitatively better than their hardcopy predecessors. Cyclical production and planned dissemination timelines continue to take precedence over real time analysis and forecasting. Doctrine and poor product design inhibit collaboration and fusion. The reason for this may be embedded in the massive digital intelligence domain, which has led to an information age "tragedy of the commons".

Contemporary society has a number of current examples of the tragedy of the commons: the depletion of fish stocks in international waters, congestion on urban highways, and the rise of resistant diseases due to the careless use of antibiotics. According to theorist Garret Hardin, in each instance people become locked into a system that compels them to exploit common resources without limit, in a world that is limited. Therein lies the tragedy. Each man pursues his own interest in a society that believes in the freedom of the commons.

The IC equivalent of the commons lies in the intelligence data, information, products, and services available on-line and via worldwide networks. The move to on-line, digital intelligence products and services has created a dilemma for producers and consumers alike. Timely, relevant, predictive intelligence is costly to produce and disseminate digitally, but its value to individual customers is too dispersed and small to effectively support a large customer base. The result is that intelligence products and services are often inadequately catalogued and organized and on-line databases tend to fill with low value information. Conversely, products and services that have high value are usually those tailored to a specific customer requirement. Therein lies the paradox of digital intelligence→ the IC's most valuable on-line data, products, and services often meet the requirements of the least amount

of customers. IC organizations are then faced with the dilemma of either producing general intelligence with limited specific value or tailored intelligence with little general value.

The Digital Intelligence Commons and the Challenges of Creating Real Time Analytical Models

The digital intelligence commons raises two significant challenges that will inhibit real-time pattern and trend product models- dissemination and classification. The IC has preferred dissemination philosophies that have alternated between a "push" vs. "pull" philosophy. The "push" philosophy is based on the idea that customers should automatically receive products and services that respond to their respective priority intelligence requirements. The "pull" philosophy requires intelligence customers to access the intelligence they need via networked, on-line knowledge bases (e.g.- INTELINK). Both methods are designed to customize support to customers, but neither provides comprehensive, real-time products across intelligence disciplines. A primary reason for this is embedded in the multitude of classified networks used to access the commons.

Classifying intelligence collection sources and methods is the responsibility of each intelligence agency. As a result, raw intelligence data and the corresponding products found in the digital intelligence commons are accessible mainly through stove-piped, agency-specific networks. Access to an intelligence agency knowledge base (e.g.- Central Intelligence Agency) requires unique network access permissions. The various network access requirements often prevent the timely fusion of intelligence that is collected on a priority intelligence requirement. This is one of the reasons that JFCOM turned to social systems analysis techniques to improve intelligence support to operations. This type of analysis could provide the mechanism to efficiently distill the diverse universe of digital

intelligence into a common, real-time product. The intent was that a continuous updating process would ensure the JFC's priority intelligence requirements were met.

Managing the digital intelligence commons is one of the most important issues facing the IC. Priorities must change from filling static databases and producing pre-planned, formatted products to processes designed to update real time analysis. Production needs to result in timely and accurate intelligence that provides context as well as predictive analysis. Collaborative production practices should be used to fuse raw data and support pattern and trend analysis. The challenge is to create processes that channel expert analysis and data through a common, yet comprehensive product or service. Models may be the best solution.

Pattern and trend models are likely the best solution for three reasons. First, models provide a structure for connecting disparate pieces of intelligence information from various sources. Second, models provide a focal point for continuous collaboration between intelligence community process owners and consumers of intelligence. Third, models provide a continuously updated product that contains historical context and current intelligence that can support predictive analysis. This type of model offers a balance between the "push" and "pull" methodology as well as the customer desire for fused, real-time intelligence. They can also be tailored to meet specific JFC priority intelligence requirements, especially those required to support effects-based operations.

Examples of Pattern and Trend Model Based on Social System Analysis

It is possible to construct pattern and trend models that represent a society using objective, persistent data feeds. Examples are found in the table below.

Political	Military	Economic	Social	Information	Infrastructure
Voting Behavior/Public Opinion	Order-of-Battle (Air Frames, Ground Equipment, etc.)	Trade Activity with Regional/International Community	Migration Activity	Communications Activity in Selected Urban, Military, and Economic zones	Transportation Network Flow (Ports, Airfields, Rails, Autos)
Government Fiscal Spending/Deficits	Training and Exercise Activities	Unemployment Rates	Population Growth/Birth Rates	Presence of Key Indications and Warning Phrases in Open Press (Using Voice Recognition Software)	
Numerical Relationship between Ruling Party and Opposition Party	Deployment Patterns	Money Supply	Numerical Relationships between Demographic Groups		
	Border Incursions	Foreign Debt	Crime Rate		

These items represent only a few of the PMESII system aspects that could provide continuous data feeds. Sociologists, political scientists, economists, civil engineers,

etc. could provide customized system indicators for each target country. The goal would be to ensure the models provide a holistic picture of activity levels without getting mired in the minute details of a "system of systems" analysis. These data feeds require new sources of information that are likely found in the unclassified domain. It may also entail using existing intelligence assets in ways to provide surveillance vice reconnaissance. One example would be to use measurement and signals intelligence to monitor transportation network flows in a target country. The challenge is to develop continuous information feeds that provide insight into the adversary without compromising our intent. As mentioned earlier, if an adversary detects we are tracking a certain pattern of behavior, they will likely attempt to deliberately alter their actions to destroy our understanding. This means that covert intelligence collection methods will be as important as ever, but they should be augmented with unclassified sources. A combination of both is needed to develop a lifelike understanding of a country.

Objective system characteristics do not necessarily take into account the rational, and sometimes irrational, events that take place inside a nation-state, system, or structure. Intelligence analysts, along with their collaborative partners, can overcome this by contributing their respective analysis to anomalies in the patterns and trends. The wider the variety of experts (e.g.- academics, multi-national partners, and national intelligence analysts) looking at the underlying patterns and trends the more comprehensive the analysis. This provides the JFC historical context and the subjective judgment needed to augment the objective data.

The activity patterns coupled with the subjective analysis provide a central product and process to distill the huge amount of information found in the digital intelligence

commons. They form the foundation for continuous collaboration among analysts. This product type is well suited to support effects-based operations. Graphically portraying normalized activity levels provides the JFC near instant feedback on military actions. Anomalies in the patterns mean he is likely having an effect.

This solution recognizes the value of modeling a social system, but it avoids getting too consumed in the subjective intricacies of a complex nation-state. The product is graphically oriented, continuously updated, and provides both historical context and predictive analysis. It supports effects-based operations and it distills a huge amount of disconnected data into one real time product. In short, it leverages our information advantage while avoiding the trap of producing ever-increasing amounts of product through ever more efficient industrial-age business practices. It helps customers and producers make better use of the digital intelligence commons.

Conclusion

General Colin Powell's advice to intelligence professionals was quite direct- *tell me what you know, tell me what you don't know, and tell me what you think...and be sure to distinguish which is which.* Social systems analysis places intelligence professionals at odds with this sound advice. Social theory is simply too subjective to apply sound systems theory or systems analysis techniques.

Substantially more research and experimentation needs to be conducted before social systems analysis methodology is adequate to mirror a complex nation-state. Even if the IC were able to produce such analysis the products would almost certainly be too large and unwieldy. They would become obsolete in a time of war.

The IC may be able to design models that represent the critical patterns and trends that underlie adversary PMESII systems. The challenge is to design models that segregate subjective analysis and facts and to ensure they relate to a Joint Force Commander's essential elements of information. The model must be easy to update and take advantage of our information advantage. It must distill the disconnected intelligence found in IC databases and be easily understood, preferably in graphic form. If successful, the JFC may be able to visualize the otherwise abstract idea of effects-based operations. This is certainly an advantage in today's wars as well as those in the future.

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